

DETAILED ACTION

Specification

The disclosure is objected to because of the following informalities:

The specification does not refer to figure 11.

Appropriate correction is required.

Drawings

The amended drawings dated 02/28/2011 appear acceptable relative to the changes made in overcoming the past objections. It is noted that it appears that the specification supports figure 11 relative to the gas injection means.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 14 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The recitation of "the first gas" (line 1) lacks antecedent basis.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 3744

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-4, 6-7, 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over the obvious modification of Swift (US 6032464).

In regard to claims 1 and 14-15, Swift (464) teaches a thermoacoustic apparatus (Fig. 13C) comprising: a loop tube (222, 210); a first stack (234) sandwiched between a first high-temperature-side heat exchanger (232; note that the heat exchangers are provided as examples and that operation at different temperatures is certainly possible) and a first low-temperature-side heat exchanger (236), the first stack (234) being provided in the loop tube (222, 210); and a second stack (216) sandwiched between a second high-temperature-side heat exchanger (218) and a second low-temperature-side heat exchanger (214), the second stack (216) being provided in the loop tube (222, 210), wherein a standing wave and a traveling wave are generated through self excitation by heating the first high-temperature-side heat exchanger (232), so that the second low-temperature-side heat exchanger (214) is cooled by the standing wave and the traveling wave (depending on the use of the system; column 15, line 48), or wherein a standing wave and a traveling wave are generated through self excitation by cooling the first low- temperature-side heat exchanger (236), so that the second high-

Art Unit: 3744

temperature-side heat exchanger (218) is heated by the standing wave and the traveling wave, wherein a support (inherent to locating the device in any location) is disposed such that the loop tube is configured to include first and second linear tube portions (222, 210), which are vertical and first and second connection tube portions (top and bottom ones) shorter than the first and second linear tube portions (222, 210), and wherein the first stack (234) is disposed in the first linear tube portion (210), wherein the second stack (216) is disposed in the second linear tube portion (left one of 222) than the first stack (234) is disposed, wherein the second stack (216) is disposed at a level higher than the first stack (234). It is noted that the working fluid is identified as argon (column 9, line 13) and also teaches helium (column 9, line 53).

Swift (464) does not explicitly teach that the torus (Fig. 13C) has an argon injection apparatus disposed at the center of the top tube in the torus (Fig. 13C) or a helium injection apparatus disposed at the center of the bottom tube in the torus (Fig. 13C; interpreted to be a structure that is capable of moving working fluid into the torus). Swift suggests providing an acoustical power apparatus (76, 40) that injects gas (cyclically via pressure waves) in the other figures (Figures 3, 4, 13A, 13D; column 6, line 50) to either the top or bottom side of the device. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify Swift (Fig. 13C) with a gas injection apparatus (76, 40) at the top or bottom of the torus for the purpose of adding acoustical power to the device and for the purpose of doing so while allowing the sides to remain available and free for heat transfer.

In regard to claim 2, see figure 13C and the column 11, line 35; column 12, line 25.

In regard to claims 3-4, it is noted that the apparatus is fully capable of operating with cooling or heating either the first or second stacks (234, 216) as an operator desires.

In regard to claim 6, note that inherent to the creation of the high and low temperatures in the thermoacoustic cycle is that the pressure of the fluid peaks in the vicinity of first and second stacks (column 5, lines 10-15, 35-37, column 4, line 40).

In regard to claim 7, Swift teaches an acoustic wave generator (40, 76) is disposed on an outer perimeter of the loop (222, 210).

Claims 1-4, 6-7, 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over the obvious modification of Swift (US 6032464) using an alternative interpretation of the gas injection apparatus. It is noted that the remaining rejections employ this interpretation.

In regard to claims 1 and 14-15, Swift (464) teaches a thermoacoustic apparatus (Fig. 13C) comprising: a loop tube (222, 210); a first stack (234) sandwiched between a first high-temperature-side heat exchanger (232; note that the heat exchangers are provided as examples and that operation at different temperatures is certainly possible) and a first low-temperature-side heat exchanger (236), the first stack (234) being provided in the loop tube (222, 210); and a second stack (216) sandwiched between a second high-temperature-side heat exchanger (218) and a second low-temperature-

Art Unit: 3744

side heat exchanger (214), the second stack (216) being provided in the loop tube (222, 210), wherein a standing wave and a traveling wave are generated through self excitation by heating the first high-temperature-side heat exchanger (232), so that the second low-temperature-side heat exchanger (214) is cooled by the standing wave and the traveling wave (depending on the use of the system; column 15, line 48), or wherein a standing wave and a traveling wave are generated through self excitation by cooling the first low- temperature-side heat exchanger (236), so that the second high-temperature-side heat exchanger (218) is heated by the standing wave and the traveling wave, wherein a support (inherent to locating the device in any location) is disposed such that the loop tube is configured to include first and second linear tube portions (222, 210), which are vertical and first and second connection tube portions (top and bottom ones) shorter than the first and second linear tube portions (222, 210), and wherein the first stack (234) is disposed in the first linear tube portion (210), wherein the second stack (216) is disposed in the second linear tube portion (left one of 222) than the first stack (234) is disposed, wherein the second stack (216) is disposed at a level higher that the first stack (234). It is noted that the working fluid is identified as argon (column 9, line 13) and also teaches helium (column 9, line 53).

Swift (464) does not explicitly teach that the torus (Fig. 13C) has an argon injection apparatus disposed at the center of the top tube in the torus (Fig. 13C) or a helium injection apparatus disposed at the center of the bottom tube in the torus (Fig. 13C) for introducing the working fluid into the torus from an exterior source. However, providing a means for introducing the working fluid is an inherent part of operating the

Art Unit: 3744

device of Swift (464) that cannot be omitted and is essential to operating the device. Also, Swift suggests providing an acoustical power apparatus (76, 40) that injects gas (cyclically via pressure waves) in the other figures (Figures 3, 4, 13A, 13D; column 6, line 50) to either the top or bottom side of the device. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify Swift with a gas injection apparatus at either the top or the bottom for the purpose of installing helium or argon and for the purpose of doing so while allowing the sides to remain available and free for heat transfer and for the purpose of conveniently permitting the injection of the working fluids to adjust the operating properties of the refrigerator.

In regard to claim 2, see figure 13C and the column 11, line 35; column 12, line 25.

In regard to claims 3-4, it is noted that the apparatus is fully capable of operating with cooling or heating either the first or second stacks (234, 216) as an operator desires.

In regard to claim 6, note that inherent to the creation of the high and low temperatures in the thermoacoustic cycle is that the pressure of the fluid peaks in the vicinity of first and second stacks (column 5, lines 10-15, 35-37, column 4, line 40).

In regard to claim 7, Swift teaches an acoustic wave generator (40, 76) is disposed on an outer perimeter of the loop (222, 210).

Art Unit: 3744

Claims 1-4, 6-7, 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Swift (US 6032464) in view of Wighard (US 5813234).

In regard to claims 1, 14-15, Swift (464) teaches a thermoacoustic apparatus (Fig. 13C) comprising: a loop tube (222, 210); a first stack (234) sandwiched between a first high-temperature-side heat exchanger (232; note that the heat exchangers are provided as examples and that operation at different temperatures is certainly possible) and a first low-temperature-side heat exchanger (236), the first stack (234) being provided in the loop tube (222, 210); and a second stack (216) sandwiched between a second high-temperature-side heat exchanger (218) and a second low-temperature-side heat exchanger (214), the second stack (216) being provided in the loop tube (222, 210), wherein a standing wave and a traveling wave are generated through self excitation by heating the first high-temperature-side heat exchanger (232), so that the second low-temperature-side heat exchanger (214) is cooled by the standing wave and the traveling wave (depending on the use of the system; column 15, line 48), or wherein a standing wave and a traveling wave are generated through self excitation by cooling the first low- temperature-side heat exchanger (236), so that the second high-temperature-side heat exchanger (218) is heated by the standing wave and the traveling wave, wherein a support (inherent to locating the device in any location) is disposed such that the loop tube is configured to include first and second linear tube portions (222, 210), which are vertical and first and second connection tube portions (top and bottom ones) shorter than the first and second linear tube portions (222, 210), and wherein the first stack (234) is disposed in the first linear tube portion (210),

Art Unit: 3744

wherein the second stack (216) is disposed in the second linear tube portion (left one of 222) than the first stack (234) is disposed, wherein the second stack (216) is disposed at a level higher than the first stack (234). It is noted that the working fluid is identified as argon (column 9, line 13) and also teaches helium (column 9, line 53).

Swift (464) does not explicitly teach that the torus (Fig. 13C) has an argon injection apparatus disposed at the center of the top tube in the torus (Fig. 13C) or a helium injection apparatus disposed at the center of the bottom tube in the torus (Fig. 13C) for introducing the working fluid into the torus from an exterior source. However, providing a means for introducing the working fluid is an inherent part of operating the device of Swift (464) that cannot be omitted and is essential to operating the device. In addition, Wighard (US 5813234) teaches that it is well known to fill thermoacoustic devices with Helium and Argon and to adjust working fluid properties by controlling the amounts of helium and argon put into the device (column 1, line 37, column 8, line 3, 10-11). Also, Swift suggests providing an acoustical power apparatus (76, 40) that injects gas (cyclically via pressure waves) in the other figures (Figures 3, 4, 13A, 13D; column 6, line 50) to either the top or bottom side of the device. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify Swift with a gas injection apparatus at either the top or the bottom for the purpose of installing the helium or argon and for the purpose of doing so while allowing the sides to remain available and free for heat transfer and for the purpose of conveniently permitting the injection of the working fluids to adjust the operating properties of the refrigerator.

In regard to claim 2, see figure 13C and the column 11, line 35; column 12, line 25.

In regard to claims 3-4, it is noted that the apparatus is fully capable of operating with cooling or heating either the first or second stacks (234, 216) as an operator desires.

In regard to claim 6, note that inherent to the creation of the high and low temperatures in the thermoacoustic cycle is that the pressure of the fluid peaks in the vicinity of first and second stacks (column 5, lines 10-15, 35-37, column 4, line 40).

In regard to claim 7, Swift teaches an acoustic wave generator (40, 76) is disposed on an outer perimeter of the loop (222, 210).

Claims 1-4, 6-7, 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Swift (US 6032464) in view of Garrett (US 5953921).

In regard to claims 1 and 14-15, Swift (464) teaches a thermoacoustic apparatus (Fig. 13C) comprising: a loop tube (222, 210); a first stack (234) sandwiched between a first high-temperature-side heat exchanger (232; note that the heat exchangers are provided as examples and that operation at different temperatures is certainly possible) and a first low-temperature-side heat exchanger (236), the first stack (234) being provided in the loop tube (222, 210); and a second stack (216) sandwiched between a second high-temperature-side heat exchanger (218) and a second low-temperature-side heat exchanger (214), the second stack (216) being provided in the loop tube (222, 210), wherein a standing wave and a traveling wave are generated through self

Art Unit: 3744

excitation by heating the first high-temperature-side heat exchanger (232), so that the second low-temperature-side heat exchanger (214) is cooled by the standing wave and the traveling wave (depending on the use of the system; column 15, line 48), or wherein a standing wave and a traveling wave are generated through self excitation by cooling the first low- temperature-side heat exchanger (236), so that the second high-temperature-side heat exchanger (218) is heated by the standing wave and the traveling wave, wherein a support (inherent to locating the device in any location) is disposed such that the loop tube is configured to include first and second linear tube portions (222, 210), which are vertical and first and second connection tube portions (top and bottom ones) shorter than the first and second linear tube portions (222, 210), and wherein the first stack (234) is disposed in the first linear tube portion (210), wherein the second stack (216) is disposed in the second linear tube portion (left one of 222) than the first stack (234) is disposed, wherein the second stack (216) is disposed at a level higher than the first stack (234). It is noted that the working fluid is identified as argon (column 9, line 13) and also teaches helium (column 9, line 53).

Swift (464) does not explicitly teach that the torus (Fig. 13C) has an argon injection apparatus disposed at the center of the top tube in the torus (Fig. 13C) or a helium injection apparatus disposed at the center of the bottom tube in the torus (Fig. 13C) for introducing the working fluid into the torus from an exterior source. However, providing a means for introducing the working fluid is an inherent part of operating the device of Swift (464) that cannot be omitted and is essential to operating the device. In addition, Garrett (921) teaches that it is well known to fill thermoacoustic devices with

Art Unit: 3744

Helium and Argon and to adjust working fluid properties by controlling the amounts of helium and argon put into the device (column 4, lines 20-25; column 8, line 1). Also, Swift suggests providing an acoustical power apparatus (76, 40) that injects gas (cyclically via pressure waves) in the other figures (Figures 3, 4, 13A, 13D; column 6, line 50) to either the top or bottom side of the device. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify Swift with a gas injection apparatus at either the top or the bottom for the purpose of installing the helium or argon and for the purpose of doing so while allowing the sides to remain available and free for heat transfer and for the purpose of conveniently permitting the injection of the working fluids to adjust the operating properties of the refrigerator.

In regard to claim 2, see figure 13C and the column 11, line 35; column 12, line 25.

In regard to claims 3-4, it is noted that the apparatus is fully capable of operating with cooling or heating either the first or second stacks (234, 216) as an operator desires.

In regard to claim 6, note that inherent to the creation of the high and low temperatures in the thermoacoustic cycle is that the pressure of the fluid peaks in the vicinity of first and second stacks (column 5, lines 10-15, 35-37, column 4, line 40).

In regard to claim 7, Swift teaches an acoustic wave generator (40, 76) is disposed on an outer perimeter of the loop (222, 210).

Art Unit: 3744

Claims 1-4, 6-7, 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Swift (US 6032464) in view of Garrett (US 5647216).

In regard to claims 1 and 14-15, Swift (464) teaches a thermoacoustic apparatus (Fig. 13C) comprising: a loop tube (222, 210); a first stack (234) sandwiched between a first high-temperature-side heat exchanger (232; note that the heat exchangers are provided as examples and that operation at different temperatures is certainly possible) and a first low-temperature-side heat exchanger (236), the first stack (234) being provided in the loop tube (222, 210); and a second stack (216) sandwiched between a second high-temperature-side heat exchanger (218) and a second low-temperature-side heat exchanger (214), the second stack (216) being provided in the loop tube (222, 210), wherein a standing wave and a traveling wave are generated through self excitation by heating the first high-temperature-side heat exchanger (232), so that the second low-temperature-side heat exchanger (214) is cooled by the standing wave and the traveling wave (depending on the use of the system; column 15, line 48), or wherein a standing wave and a traveling wave are generated through self excitation by cooling the first low- temperature-side heat exchanger (236), so that the second high-temperature-side heat exchanger (218) is heated by the standing wave and the traveling wave, wherein a support (inherent to locating the device in any location) is disposed such that the loop tube is configured to include first and second linear tube portions (222, 210), which are vertical and first and second connection tube portions (top and bottom ones) shorter than the first and second linear tube portions (222, 210), and wherein the first stack (234) is disposed in the first linear tube portion (210),

Art Unit: 3744

wherein the second stack (216) is disposed in the second linear tube portion (left one of 222) than the first stack (234) is disposed, wherein the second stack (216) is disposed at a level higher than the first stack (234). It is noted that the working fluid is identified as argon (column 9, line 13) and also teaches helium (column 9, line 53).

Swift (464) does not explicitly teach that the torus (Fig. 13C) has an argon injection apparatus disposed at the center of the top tube in the torus (Fig. 13C) or a helium injection apparatus disposed at the center of the bottom tube in the torus (Fig. 13C) for introducing the working fluid into the torus from an exterior source. However, providing a means for introducing the working fluid is an inherent part of operating the device of Swift (464) that cannot be omitted and is essential to operating the device. In addition, Garrett (216) teaches that it is well known to fill thermoacoustic devices with Helium and Argon and to adjust working fluid properties by controlling the amounts of helium and argon put into the device (column 8, line 1). Also, Swift (464) suggests providing an acoustical power apparatus (76, 40) that injects gas (cyclically via pressure waves) in the other figures (Figures 3, 4, 13A, 13D; column 6, line 50) to either the top or bottom side of the device. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify Swift with a gas injection apparatus at either the top or the bottom for the purpose of installing the helium or argon and for the purpose of doing so while allowing the sides to remain available and free for heat transfer and for the purpose of conveniently permitting the injection of the working fluids to adjust the operating properties of the refrigerator.

In regard to claim 2, see figure 13C and the column 11, line 35; column 12, line 25.

In regard to claims 3-4, it is noted that the apparatus is fully capable of operating with cooling or heating either the first or second stacks (234, 216) as an operator desires.

In regard to claim 6, note that inherent to the creation of the high and low temperatures in the thermoacoustic cycle is that the pressure of the fluid peaks in the vicinity of first and second stacks (column 5, lines 10-15, 35-37, column 4, line 40).

In regard to claim 7, Swift teaches an acoustic wave generator (40, 76) is disposed on an outer perimeter of the loop (222, 210).

Claims 5-6, 11, 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over any of the rejections above and further in view of Swift (US 6164073).

In regard to claim 5, Swift (464) does not appear to teach the location of the center of the stack (216) in relation to the ends of the vertical tube portions (222, 210), however, it is noted that the stack's location in Swift (464) appears to be located near the same location as in the applicant's figure. Further, it is seen that the locating of the stack in the loop is nearly inherent in order for the device to operate properly (column 5, lines 60-65 - shows that the length of the torous is explicitly considered). Lastly considering that the stack's location is shown in the Swift (464) it is considered a matter of routine experimentation to determine the optimal location relative to the length of the loop. Therefore, it would have been obvious to one of ordinary skill in the art, at the

Art Unit: 3744

time the invention was made, to locate the stack at about $\frac{1}{4}$ the length of the tube portions for the purpose of providing the optimal thermoacoustic torus loop.

Furthermore, the same reasoning applies to claim 6 in addition to the evidence that the pressures must peak near the stacks.

In regard to claim 11, Swift (464) teaches most of the claim limitations, but does not explicitly teach a stack structure that provides flow path lengths of individual connection channels are decreased one after another from the medial to the lateral ends of the stack. However, Swift (073) teaches that the stack (32, 34) is formed from plates (column 5, line 6) in a circular cross section tube for a thermoacoustic cooler, and therefore there is a flow length (when viewing the cross-section) that is decreased when moving from the medial to the lateral ends. Swift (073) further teaches that such stack structure was previously invented (column 5, lines 1-5). Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to employ the stack structure of Swift (073) in the cooler of Swift (464) for the purpose of improving the efficiency of the cooler and employing a stack structure that has been shown to be effective.

In regard to claim 13, Swift (464) teaches most of the claim limitations, but does not appear to teach staging the low temperature heat exchangers of at least two thermoacoustic coolers. However, Swift (073) teaches such staging is old in the art of thermoacoustic coolers (column 7, lines 50-55), additionally and/or alternatively cascade refrigeration is a well known and old method of producing lower refrigeration temperatures. Therefore, it would have been obvious to one of ordinary skill in the art,

Art Unit: 3744

at the time the invention was made, to provide cooling from one low temperature heat exchanger to another thermoacoustic cooler for the purpose of providing cooling at lower temperatures.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over any of the rejections above and further in view of Smith (US 2003/0192324). Swift (464) as modified teaches most of the claim limitations including, that the product of the angular frequency and temperature relaxation time is in the range of 0.2 to 20 (since $\omega\tau = (2\pi \text{frequency}) \cdot (r^2 / 2\alpha)$ and Swift (464) shows that the flow path radius is about 12 micrometers - column 9, line 35, and 42 micrometers - column 11, line 39 and the fluid is argon defining the diffusion coefficient, therefore the value is a function only of frequency which is user set and therefore the device of Swift (464) is fully capable of such range), but does not appear to teach sintered metal for the regenerator, however, Smith (324) (parag. 99) teaches that regenerators are known to be sintered. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to sinter the screens of Swift (464) for the purpose making the handling and installation of the regenerator easier and for the purpose of making ensuring the orientation of the regenerator material for uniformity of flow.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over any of the rejections above and further in view of Belaire (US 4057962). Swift (464) as modified teaches most of the claim limitations including, that the product of the angular

Art Unit: 3744

frequency and temperature relaxation time is in the range of 0.2 to 20 (since $\omega \tau = (2\pi \text{frequency}) \cdot (r^2 / 2\alpha)$ and Swift (464) shows that the flow path radius is about 12 micrometers - column 9, line 35, and 42 micrometers - column 11, line 39 and the fluid is argon defining the diffusion coefficient, therefore the value is a function only of frequency which is user set and therefore the device of Swift is fully capable of such range), but does not appear to teach sintered metal for the regenerator, however, Belaire (column 3, lines 54-61) teaches that regenerators are known to be sintered. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to sinter the screens of Swift (464) for the purpose making the handling and installation of the regenerator easier and for the purpose of making ensuring the orientation of the regenerator material for uniformity of flow.

Response to Arguments

Applicant's arguments filed 02/28/2011 have been fully considered but they are not persuasive.

1. Applicant's arguments (pages 9-10) are that the claim objections, the drawing objections, and the rejections under 35 U.S.C. § 112, first paragraph have been obviated. In response, it is agreed and the objections and rejections are withdrawn.

2. Applicant's arguments (page 10, ¶ 3) are an allegation that Swift does not teach a gas injection means as claimed. In response, it is noted that it appears that the applicant is alleging that the pressure wave generators are not gas injection means. It is noted that the broadest reasonable interpretation of the claimed gas injection means

Art Unit: 3744

is a structure that is capable of moving working fluid into the torus. Clearly the pressure wave generators are capable of moving fluid into the torus, albeit cyclically. Therefore the allegation is unpersuasive.

In addition to these grounds, the detailed rejection above also shows that it would have been obvious to one of ordinary skill in the art to alternatively provide a gas injection means to the top or bottom of the torus assuming that the broadest reasonable interpretation of the claimed gas injection means were a structure capable of allowing working fluid to be introduced into the torus from an exterior source. In view of this grounds of rejection it is noted that the teachings of Swift (464) relative to providing pressure wave generators is suggestive to providing fluid entry at these locations. Further it is noted that the teachings of Swift (464) relative to the stacks and heat exchangers (see Fig. 13C) further suggests providing a gas injection means on the top or bottom of the Torus for the purpose of providing space for heat exchange with the sides of the Torus. It is further noted that, given the claim as a whole, the claimed gas injection apparatus is interpreted as a structure capable of permitting a flow of gas into the Torus for filling the Torus. Therefore, the claims is considered to be an obvious modification of Swift (464) in view of the prior art above.

3. Applicant's arguments (page 10, ¶ 4) are that none of the other references teach "the missing elements of Swift (464)". In response, it is presumed the applicant is alleging that none of the references teach a gas injection means at the center of the top or bottom tubes of a Torus. It is noted that the law does not require that the other prior art references must teach a Torus (or in effect all of the limitations of the claim) in order

Art Unit: 3744

for their teachings to be probative with the teachings of Swift (464) that the modification would be obvious to one of ordinary skill in the art. As described in detail above, locating the gas injection means at the top or bottom of the Torus would be an obvious location for the purpose of providing space for heat exchange with the sides of the Torus of Swift (464).

4. Applicant's arguments (page 11, ¶ 1) are a mere allegation that modification would be unpredictable. In response, it is noted that the allegation alone with no other rationale or evidence is not sufficient to overcome the rationale and evidence presented in the rejection above.

5. Applicant's arguments (page 11, ¶ 2) are an allegation that the teachings of Swift (464) are that helium or argon may be used. In response, it is noted that it is agreed that Swift (464) teaches the use of either helium or argon. However, it is disagreed that those of ordinary skill in the art would find it non-obvious to inject gas into the torus at the top or bottom of the torus since Swift (464) suggests the top and bottom as appropriate locations for fluid ports.

6. Applicant's arguments (page 13) are that Garrett does not teach the locating of the gas injection apparatus at the center of the top or bottom of the torus. In response, the examiner notes that Swift (464) suggests the fluid entry location with the teachings of the pressure wave generators (76, 40). It is noted that the allegation that none of the references teach argon is incorrect and unpersuasive as all of the references teach argon as a working fluid and specifically teach using argon with helium as a mixture. Therefore the allegation is unpersuasive.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John F. Pettitt whose telephone number is 571-272-0771. The examiner can normally be reached on M-F 8a-4p.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler or Frantz Jules can be reached on 571-272-4834 or 571-272-6681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/John F Pettitt /
Examiner, Art Unit 3744

JFP III
August 23, 2011